CBSE Sample Paper 6

General Instruction:

1. Answer all questions
2. Internal choices are provided for some questions
3. Question numbers 1 to 8 are very short answer questions and carry 1 mark each.
4. Question numbers 8 to 18 are short answer questions and carry 2 marks each.
5. Question numbers 19 to 27 are also short answer questions and carry 3 marks each.
6. Question numbers 28 to 30 are long answer questions and carry 5 marks each.
7. Use log tables if necessary.

Very Short Answer type questions

Question 1
A positive charge q is placed near a pole of the magnet. What will happen to the charge? Will it start moving towards the magnet? What if the charge is negative?

Question 2
Arrange the α particle ,γ particle and β particle in decreasing order of the penetrating power

Question 3
A wire is bent into a circular loop of radius R_0 and carries a current I. The magnetic field at the center of the loop is B. The same wire is bent into double loop and both loops carry the current I in the same direction. Find the magnetic field at the center of loop in this case in terms of B?

Question 4
When are the voltage and current in L-C-R series AC circuit in same phase ?.

Question 5
What is the relation between energy and momentum of the photon?

Question 6
A solenoid with an iron core and bulb are connected to a DC source. How does the brightness of the bulb change ,when iron core is removed from the soleniod?

Question 7
Define the term self inductance?

Question 8
Define the term wavefront?

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Short Answer type questions

Question 9
a)Write down the expression for the energy stored in charged capacitor in terms of charge and capacitance
b) Where is energy stores in the charged capacitor?

Question 10
Why is energy released in nuclear fission ?
Which of the two U^{238} and U^{235} is more useful for nuclear fission and why?

Question 11
- The most commonly used material for making transistor is
- What are the charge carrier in n and p type of conductor
- N –type conductor are electrically neutral. True or false

Question 12
Hydrogen atom has only one electron ,but its emission spectrum has many lines Explain with reason?

Question 13
Two bulb of resistance R_1 and R_2 ($R_2 > R_1$) are connected in parallel ,which bulb will be brighter? What if the bulb are connected in series?

Question 14
75% of the radioactive element disintegrates in 24years? Calculate the half life of the element?

Question 15
How does the resistivity of conductor and semiconductor varies with temperature. Explain with reason?

Question 16
Three positive charges Q_1, Q_2, Q_3 are placed in x,y,z coordinates system at the following location (0,0,0) , (0,2,0) and (0,0,2) respectively. Answer following questions
1) Find the flux through the spherical shell with origin as center and of radius 1 m
2) Find the Flux through the spherical shell with origin as center and radius of 3 m

Question 17
How can three resistance 4ohm, 3ohm and 6 ohm can be connected to give an equivalent resistance of 6 ohm?

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Question 18
The AC source is marked 220V-50Hz.

a) What is the peak voltage
b) The equation of instantaneous voltage

Question 19
Obtain the circuit diagram of AND and OR gates by using the p-n junction diode and resistance?

Question 20
The magnifying power of an astrominical telescope for relaxed eye is 8 and length of the telescope is 18 cm .Calculate the focal length of the lenses?

Question 21
What is the path of the charged particle in the uniform magnetic field if its velocity is not perpendicular to the magnetic field? Explain

Question 22
The self inductance of a current carrying coil is 40 mH.Calculate the induced emf when the current changes from 1 A to 10 A in 2 millisecond?

Question 23
What are nuclear forces? .Explain the origin of nuclear forces on the basis of Yukawa Mesons theory ?

Question 24
How many types of emission spectrum exist? How are they produced?

Question 25
The activity of a radioactive substance becomes 1/4 of the original value in the period of 10 years. After a further lapse of 20 years,how many times will its activity be of of original value?

Question 26
How is p-n junction diode used as full wave rectifier? Discuss the working with the help of simple circuit?

Question 27

i) Derive an expression for the magnetic field of a circular current carrying loop
ii) Provide the expression for the magnetic field at the point on the axis of the current carrying loop?
iii) What will the magnetic field at the center of a semi circular wire carrying current i

Question 28

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Derive the relation between the distance of object,distance of image and radius of curvature of convex spherical surface,when refraction takes place from rarer to denser medium and image formed is real. State the assumption and convention of sign used

OR

What is achromatic lens? Deduce the condition for achromatic combination of two lenses

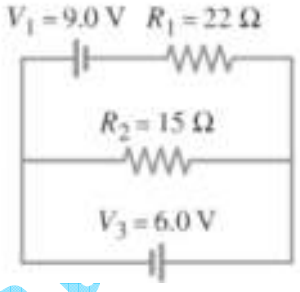
Question 29

i) Define the term the root mean square (rms) value of AC and derive the relation between the peak and rms value

ii) what is power factor of the LCR AC circuit and what happens to it at resonance?

iii)In an LR series AC circuit,the potential difference across the inductance and resistance are 3 V and 4 V respectively. Determine the total Potential difference across the circuit

Question 30



Determine the magnitude and direction of current through R_1 and R_2

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Solutions

Solution 1
Charge will not move whether positive or negative
Solution 2
$\gamma > \beta > \alpha$

Solution 3
The radius of the double loop
$r=R_0/2$

Magnetic field due a loop of radius r at the center of the loop is

$$B_1 = \frac{\mu_0 I}{2r} = \frac{\mu_0 I}{R} = 2B$$

Similarly for other loop

$$B_2 = \frac{\mu_0 I}{2r} = \frac{\mu_0 I}{R} = 2B$$

Since the current in same direction,
Total magnetic field $=B_1+B_2=4B$

Solution 4
At resonance

Solution 6

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The brightness of the bulb remains unchanged because inductance reactance in a DC circuit remains zero

Solution 7

$i_E = i_B + i_C$

Solution 9

E=ρj

Where ρ is the specific resistance of the conductor

Unit of specific resistance is Ohm-m

Solution 12

Every atom has certain definite energy states. In normal state,electron of hydrogen atom stays in the lowest energy level. When the atom get appropriate energy from outside,then this electron moves to higher energy state. With in nearly 10^{-8} sec,the electron leaves the higher energy level.Now it can return directly to lowest energy state or after passing through the other energy levels.Since there are innumerable atoms in a light source (hydrogen lamp),hence all possible transistion happens in the source and many lines are seen in the spectrum

Solution 15

i) The resistivity of a metal increases with temperature. As temperature increases,the thermal speed of the free electron increases. Their coliision frequency increases and relaxtion time decreases. Consequently the resistivity increases

ii) The resistivity of semi conductor decreases rapidly with temperature. As temperature increases,many covalent bond of the semi-conductor begin to break setting a free a large no of electrons. This increases the conductivity or decreases the resistivity

Solution 16

1) **Flux will be given as**

$$\boldsymbol{\phi = \frac{Q_1}{\varepsilon_0}}$$

2) Flux will be given as

$$\boldsymbol{\phi = \frac{Q_1+Q_2+Q_3}{\varepsilon_0}}$$

Solution 17

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3 ohm and 6 ohm are connected in parallel to give a resistance of 2 ohm and the remaining 4 ohm is connected to the parallel combination in series to give equivalent resistance of 6 ohm

Solution 18

V_{rms}=200

$V_0 = V_{rms}\sqrt{2}$

Instantaneous Voltage

$V = 311\sin(100\pi t)\ \ Volt$

Solution 20

$$I_{rms} = \sqrt{\frac{I_A^2 + I_B^2}{2}}$$

Solution 25

If the radiation of wavelength λ ejects photoelectron of maximum kinetic energy E_k from a metal surface,then

$$E_K = \frac{hc}{\lambda} - W$$

Where W is the work function of the surface

If V_0 volt be the stopping potential ,then

$E_k=eV_0$ where e is electronic charge,then

$$eV_0 = \frac{hc}{\lambda} - W$$

$$\lambda = \frac{hc}{W + eV_0}$$

Substituting all the known values,we get

λ=1027 Å

The photon energy corresponding to λ=1027 Å is

$$\frac{12375}{1027} = 12.1eV$$

Now ,the energy levels of the hydrogen atom is given by

$$E_n = -\frac{13.6}{n^2}eV$$

This gives

E_1=-13.6eV

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E_2=-3.4eV
E_3=-1.5eV
Now
E_3-E_1=12.1eV
Thus energy levels emitting 1027Å are n=3 and n=1

Solution 27

$$F = \frac{\mu_0 I I_1}{2\pi} b\left[\frac{1}{d} - \frac{1}{d+a}\right]$$

F=1.067X10^{-6} N and it is away from the wire

Solution 29
Impedance of the circuit is

$$Z = \omega L - \frac{1}{\omega C}$$

Substituting the given values
Z=4.5Ohm

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